Subject: Epidemiology

Part A: Epidemiology

1. Objectives

At the end of the course, the learners will be able to:

a. Explore scientific bases of epidemiology
b. Describe causality with appropriate inferences
c. Conduct different types of epidemiologic studies in various settings
d. Understand and practice evidence-based public health
e. Critically review different scientific papers
f. Develop knowledge and skills in field epidemiology
g. Apply the concept of social epidemiology in public health
h. Conduct disease control and prevention as well as health promotion services
i. Apply epidemiologic methods in health services management and health research

2. Course contents

I. Basic Epidemiology

Unit 1: Introduction to epidemiology 12hrs

a. Epidemiology and public health
b. Scope and uses of epidemiology
c. Historical development of epidemiology
d. Exploring the scientific bases of epidemiology and epidemiological studies

Unit 2: Association and causation 12 hrs

a. Risk and risk factors
b. Relative risk – risk ratio, odds ratio, rate ratio
c. Attributable risk, population attributable risk
d. Association and causation
e. Establishing cause of a disease – Hill's criteria for causal relation, Rothman's component causes model, Wheel model, Biomedical model, Directed Acyclic graph (DAG), Multifactorial causation

Unit 3: Epidemiological study designs and research ethics 12hrs

a. Observational studies – descriptive and analytical designs
b. Ecological studies
c. Cross-sectional studies, longitudinal studies
d. Case control study, nested case control study

e. Cohort studies - prospective cohort study, retrospective cohort study, retrospective- prospective cohort study
f. Advanced cohort studies – case-cohort study, cross over design
g. Experimental study – pre-experimental, true experimental, quasi experimental
h. Randomized controlled trial – cluster randomized controlled trial, clinical trial
i. Formal design of clinical trial – concurrent parallel study designs, cross-over study designs
j. Ethical issues in epidemiological studies

Unit 4: Errors and bias in research and evidence-based public health 12hrs

a. Errors and biases in designing and conducting a research and measures in controlling them
b. Selection and information bias
c. Confounding and effect modification
d. Power of a study, Type I and Type II error, confidence interval
e. Evidence-based public health – domains that influence evidence-based decision making, bridging evidence and practice in public health
f. Critical appraisal of research articles

Unit 5: Clinical epidemiology 10hrs

a. Concept, scope and approach
b. Normality and abnormality
c. Number needed to treat
d. Natural history and prognosis
e. Reliability
f. Validity
g. Sensitivity
h. Specificity
i. Predictive value
j. Receiver operating characteristic (ROC) curve
k. Likelihood ratio

Unit 6: Genetic epidemiology 5 hrs

a. Genetic epidemiology and genetics
b. Ethical issues

Unit 7: Field epidemiology 10hrs

a. Concept of field epidemiology
b. Field techniques – development of research proposal and tools
c. Preparedness, investigation and response of an epidemic

d. Disease surveillance and use of surveillance data
e. Development and evaluation of the screening programs
f. Disaster epidemiology
g. Types of epidemics and management

Unit 8: Social epidemiology 12hrs

a. Concept, scope and process of social epidemiology
b. Evolution of social epidemiology
c. Application of social epidemiology in public health
d. Social stratification and social class
e. Social determinants of health
f. Equality, equity and social justice in health

Unit 9: Multivariable models for epidemiology

a. Applied regression analysis (Linear and logistic regression), conditional logistics, survival analysis, Cox regression model
b. Proportional hazards modeling

Unit 10: Prevention and control of diseases and health conditions 24hrs

a. International classification of disease (ICD-11)
b. Epidemiological transition
c. Concept of Global Burden of disease
d. Epidemiological overview of public health problems in Nepal
    - Communicable diseases
    - Non-communicable diseases (cancer, COPD, diabetes/hypertension, mental health, heart disease)
e. Accidents and injury epidemiology
f. Cross-border health issues

Unit 11: Epidemiology, health policy and planning 11hrs

a. Role of epidemiology in health policy formulation, planning and evaluation of health services
b. Steps in the planning process

II: Advanced and Applied Epidemiology

Unit 12: Nutritional epidemiology

Unit 13: Environmental epidemiology

Part B: Research Methods

1. Objectives

At the end of the course, the learners will be able to:

a. Explain the concepts, process and steps involved in conducting health research
b. Select suitable approaches to quantitative and qualitative data analysis
c. Design quantitative and qualitative research
d. Apply mixed methods in different research activities
e. Demonstrate a critical understanding of various research methods.
f. Reflect critically on evidence-based practice in public health issues
g. Demonstrate knowledge and understanding of the assumptions of the research approaches that are commonly used in public health and other relevant areas.
h. Demonstrate skills in processing, interpretation and use of data
i. Develop a research proposal on a selected health problem

2. Course contents

Unit 1: Theoretical orientation on research methodology 20hrs

a. Research paradigm and knowledge generation
b. Research problems
c. Research objectives
d. Research framework
e. Research design
f. Rationale of research
g. Literature review
h. Ethics and research

Unit 2: Process of research 10 hrs

a. Identifying research problems
b. Setting research objectives
c. Deciding research design
d. Literature search and review
e. Data collection – Techniques, tools and process
f. Data analysis – management and analysis process
g. Validity and reliability

Unit 3: Qualitative research Method 15hrs

a. Qualitative research designs

b. Selection of participants
c. Instruments of qualitative study
d. Qualitative data collection methods
e. Qualitative data analysis
f. Trustworthiness of Qualitative data

Unit 4: Mixed method in health research 5hrs

a. Introduction to Mixed Methods (MM) study
b. Theory of mixed methods
c. Variations on the MM Designs
d. Characteristics of MM Studies

Unit 5: Development of research proposal 10hrs

a. Proposal of a research project - concept of proposal, components of a research proposal, research development process, obtaining ethical approval.

Unit 6: Writing Research Report

a. Concept of research report
b. Components of research report
c. Organizing results
d. Discussions of the results
e. Limitations of research
f. Conclusion and recommendation

Unit 7: Research report dissemination

a. Oral presentation
b. Poster presentation
c. Publication

Part C: Pedagogical methods

1. **Objectives**

   At the end of the course, the learners will be able to:

   1. Discuss the objectives and philosophies of pedagogy
   2. Explain the required qualities for teaching in higher education
   3. Discuss various pedagogical approaches used in education
   4. Describe the relationship between curriculum and pedagogy
   5. Describe the methods of student evaluation and assessment

2. **Contents**

   a. Objectives and philosophies of pedagogy
   b. Required qualities for teaching in higher education: individual, social and occupational/professional
   c. Pedagogical approaches (teaching methods and media) in education
   d. Curriculum and Pedagogy
   e. Balanced model of curriculum
   f. Methods of student evaluation and assessment: formative, summative and diagnostic